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...given in [Fish81] by applying it to a **combinatorial** problem  
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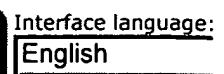
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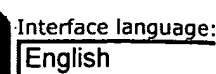
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Erhan Kutanoglu and S. David Wu. *On combinatorial auction and Lagrangean relaxation for distributed resource scheduling*. IIE Transactions, to appear.

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# Combinatorial (Bundle) Auctions

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**Session:** SD11

**Date/Time:** Sunday 15:00-16:30

**Type:** Invited

**Sponsor:**

**Track:**

**Cluster:** Integer Programming

**Room:**

**Chair:** Steef L. van de Velde

**Chair Address:** Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR , The Netherlands

**Chair E-mail:** [svelde@fac.fbk.eur.nl](mailto:svelde@fac.fbk.eur.nl)

**Chair:**

**Chair Address:**

**Chair E-mail:**

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## **SD11.1 Combinatorial Auctions from a Primal-Dual Perspective**

- o Andreas S. Schulz; MIT, Sloan Sch. of Mgmt. & OR, BLdg. E53-361, 30 Acorn St., Cambridge, MA 02142-1320; [schulz@mit.edu](mailto:schulz@mit.edu)
- o Rudolf Muller; University of Maastricht, Dept. of Quantitative Econ., Maastricht, 6200 MD , The Netherlands; [r.muller@ke.unimaas.nl](mailto:r.muller@ke.unimaas.nl)

An important aspect of the design of combinatorial auctions is the winner determination problem. We take a look at primal-dual algorithms, which share 3 favorable properties: computed solutions are supported by individual item prices, corresponding payment schemes may enforce truth revelation and certificates of optimality of assignments are immediately available.

## **SD11.2 Complexity & Algorithms for Winner Assignment in Combinatorial Auctions**

- o Rudolf Muller; University of Maastricht, Dept. of Quantitative Econ., Maastricht, 6200 MD , The Netherlands; [r.muller@ke.unimaas.nl](mailto:r.muller@ke.unimaas.nl)
- o Stan van Hoesel; University of Maastricht, Dept. of Quantitative Econ., Maastricht, 6200 MD , The Netherlands; [s.vanhoesel@ke.unimaas.nl](mailto:s.vanhoesel@ke.unimaas.nl)

We present an analysis of the complexity of the problem to assign bids to bidders in combinatorial auctions. We show that the case of identical assets can be solved in polynomial time. We give some computational results using integer linear programming formulations and heuristics

## **SD11.3 The Winners Determination Problem in Tendering Transportation Services**

- o Steef L. van de Velde; Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR , The Netherlands; [svelde@fac.fbk.eur.nl](mailto:svelde@fac.fbk.eur.nl)
- o Roelof Kuik; Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR , The Netherlands; [rkuik@fac.fbk.eur.nl](mailto:rkuik@fac.fbk.eur.nl)
- o Linda van Norden; Erasmus University, Rotterdam Sch. of Mgmt., PO Box 1738, Rotterdam, 3000 DR , The Netherlands; [lnorden@fac.fbk.eur.nl](mailto:lnorden@fac.fbk.eur.nl)

The tendering process for outsourcing transportation of bulk chemicals can be seen as a



combinatorial auction. We present an algorithm for the solution of the winners determination problem.

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